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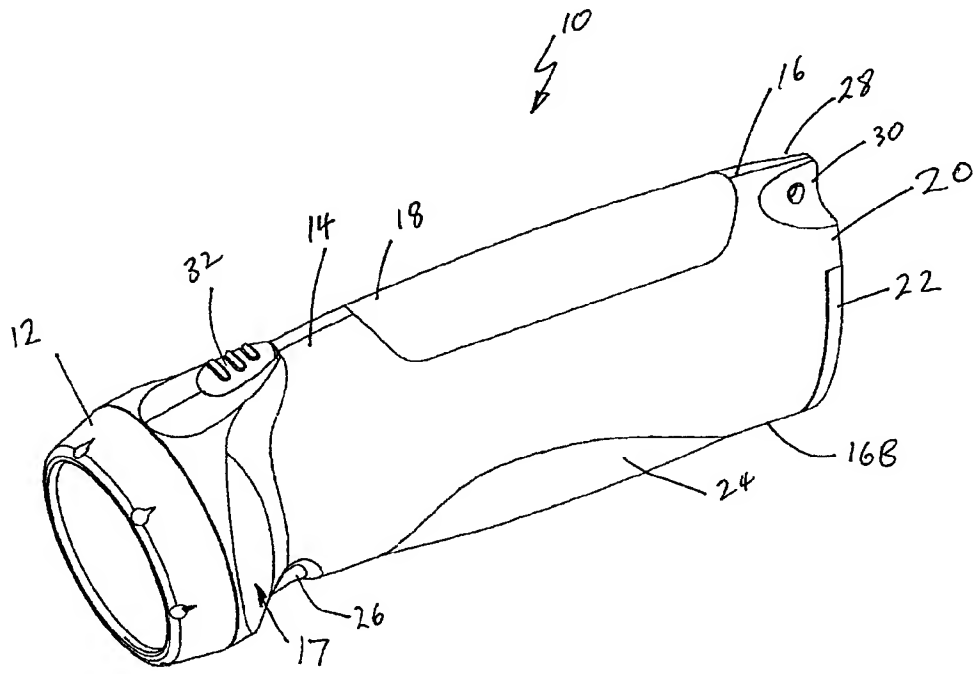
(54) Title: FLASHLIGHT WITH FLUORESCENT AREA LIGHT CAPABILITY



(57) Abstract: A lighting device or combined area light/flashlight (10) includes a handle portion (14) having a cross section which comprise narrow ends which diverge as they extend toward a central portion of the cross section; a first lens assembly (12) at an end of the handle portion (14), and a second lens assembly (18) in the handle portion (10) at one of the narrow ends of the cross section, the second lens assembly (18) contoured to match the handle portion (10).

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FLASHLIGHT WITH FLUORESCENT AREA LIGHT CAPABILITY

Field of the invention

The present invention relates to a hand held lighting device having both flashlight and fluorescent area light capability.

Background of the invention

Prior art flashlights of the type to which this invention relates tend to be quite cumbersome to use and are difficult to hold in a user's hand.

Summary of the invention

A lighting device including:

a generally elongate handle having a width which is narrower than its depth, the handle tapering along at least one side thereof in transverse cross-section;

a first lens assembly mounted to one end of the handle adapted to direct a light beam in a direction which is substantially coaxial with the length of the handle; and

a second lens assembly located in the handle and aligned generally parallel to the length of the handle, the second lens assembly adapted to direct light emitting from the lens assembly in a direction generally perpendicular to the length of the handle.

A lens assembly for a flashlight, said lens assembly including first and second generally elongate translucent panels, inclined relative to each other and joined together along a common longitudinal edge; a reflector located between the two panels adapted to reflect light towards said common edge, and an elongate fluorescent lamp mounted within the triangular space defined between the reflector and the two translucent panels and extending parallel to said common edge.

The present invention provides a lighting device including:

a handle portion having a cross section which comprises narrow ends which diverge as they extend toward a central portion of said cross section;

a first lens assembly at one end of said handle portion;

a second lens assembly located in said handle portion at one of said narrow ends of said cross section, said second lens assembly contoured to match said handle portion.

The second lens assembly has a fluorescent lamp associated therewith. The fluorescent lamp can be of a diameter in the range of 2mm to 8mm but is preferably of approximately 3mm in diameter and preferably consumes energy at the rate of approximately 4 watts.

Preferably said handle portion is curved or angled so that when a rear portion of said handle is substantially horizontal said first lens assembly will direct light at an angle to the horizontal.

The narrow ends of said cross section can diverge towards the centre of said cross section. Alternatively the handle's cross section can have a constant width for a predetermined length between said ends which diverge towards the centre of said cross section.

The tapering of the handle is preferably along one edge but may be along both. The shape of the taper can be part elliptical, part lenticular or triangular. If the tapering of the handle is along both edges of the handle the handle portion in cross section will preferably be elliptical, lenticular, lozenge shaped, an irregular hexagonal or irregular octagonal. Preferably the shape employed has a major axis of symmetry and a minor axis of symmetry, but may have only one axis of symmetry as is the case with a triangular shape.

Brief description of the drawings

An embodiment of the present invention will no be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a flashlight/area light of the present invention.

Figure 2 is a cross section through the light of figure 1.

Figure 3 is a cross section through the handle portion of the light of figure 1.

Figure 3a is an alternative cross sectional shape to that of figure 3.

Figure 3b is a further alternative cross sectional shape to that of figure 3.

Figure 3c is a further alternative cross section shape to that of figure 3.

Figure 3d is a further alternative cross section to that of figure 3.

Figure 3e is a further alternative cross section to that of figure 3.

Figure 3f is a further alternative cross section to that of figure 3.

Figure 4 is a top view of the light of figure 1.

Figure 5 is an underneath view of the light of figure 1.

Figure 6 is a rear view of the light of figure 1.

Figure 7 is a front view of the light of figure 1.

Figure 8 is a rear perspective view of the light of figure 1.

Detailed description of the embodiments

Illustrated in figure 1 is a flashlight 10 having a first lens assembly 12 located at a forward end of a handle 14. The flashlight 10 has a transition portion 17 between the lens assembly 12 and the handle 14. Along a relatively narrow upper edge or spine 16 of the handle 14 is a second lens assembly 18. The lens assembly 18 is located within the contour of and thus forms part of the handle 14 and has an external shape in cross section which is the same as the cross section of the handle 14. The second lens assembly 18 is shaped and configured to conform to the shape and configuration of the handle 14 so that the lens 18 provides a smooth continuation of the contours of the handle 14. More will be said about the lens assembly 18 below.

The rear 20 of the handle 14 includes a battery housing end cap 22 and a rubber grip 24 is located around a relatively narrow lower end 16B. A cut out 26 in the lower portion of the transition section 17 provides a positive location for engagement of a user's finger when the flashlight 10 is used in flashlight mode. At the rear end of the upper spine 16 are two cut away or scalloped portions 28 and 30 which allow for the attachment of a wrist grip or similar article.

At an upper portion of the transition section 17 is an on/off switch 32 which is connected to a power circuit so as to switch on and/or off an incandescent lamp in the lens assembly 12 by moving the switch 32 from an off position to an on position in a first direction will switch on said flashlight 10 in flashlight mode. Pushing the switch 32 in the other direction switches on a fluorescent lamp located in the lens assembly 18.

Illustrated in figure 2 is a longitudinal cross section through the apparatus of figure 1 where it can be seen that the flashlight 10 has a battery housing portion 40 in which four batteries/dry cells 42T and 42B are housed in series connection. The circuit in which the batteries 42T and 42B are connectable, is generally in the open condition with the switch 32 in a middle off position. It will be noted that the batteries 42T overlie the batteries 42B. This allows the handle to be of slender configuration in cross-section, as described in more detail below.

The positive end of rearward top battery 42T and the negative end of the rearward bottom battery 42B are electrically connected by means of a coiled contact 44. To open the battery housing closure 22, in order to gain access to the battery housing 40, the closure 22 is rotated or

translated out of the page of figure 2 whereby the coiled portion of coiled contact 44 slides over the negative terminal of rearward battery 42B and the positive terminal of rearward battery 42T.

The lower portion 14B of the handle 14 has a recess 42 which is of substantially the same peripheral shape as rubber grip 24 and of a depth similar to the thickness of rubber grip 24 so that when rubber grip 24 is applied by adhesive to the lower portion 14B of handle 14, a relatively smooth transition of the surfaces of the rubber pad to the surfaces of the handle 14 is achieved.

The lens assembly 12 at the front of the flashlight 10 includes a lens cover 46 which lies adjacent to the terminus of a reflector 48. The reflector surrounds an incandescent lamp 50 centrally located through the reflector 48.

The second lens assembly 18 includes a contoured elongated lens 52, a similarly elongated reflector 54 (which has a generally U-shaped cross section) and a fluorescent lamp 56 passing through the ends 58 and 60 of the reflector 54. The fluorescent lamp 56 is generally circular in cross section and has a 3mm diameter and 4 watts of power consumption. A 3mm diameter size fluorescent lamp is most preferred although a lamp having a diameter in the range of 2mm to 8mm can also be used.

The fluorescent lamp 56 is preferably of the cold cathode fluorescent type but other types may be suitable.

Located beneath the lens assembly 18 and above the battery housing 40 as is illustrated in figure 2 is a printed circuit board 62 for carrying the components required to operate fluorescent lamp 56 and other electronic functions as are required to switch between a flashlight mode and an area light mode utilising a fluorescent lamp.

Figure 3 is a transverse cross section of the flashlight handle 14 through approximately the mid way point along the length of the handle 14.

As can been seen in figure 3 the transverse cross section of the handle portion 14 tapers along the end which houses the fluorescent lamp and lens assembly. More specifically the taper is of a generally elliptical or lenticular shape having relatively narrow top and bottom ends 16 and 16B respectively. Generally speaking the shape is such that the width of the cross section at the ends 16 and 16B in narrower than the central portion of the handle. The handle is preferably substantially symmetrical about both a vertical plane and a horizontal plane extending along the longitudinal centre line of the handle. Preferably the major axis from end 16 through to end

16B is approximately 50mm in length whilst the minor axis or width of the cross section is approximately 25mm. In a user's hand in flashlight mode the bottom end 16B should rest against a user's palm, while top end 16 should be near a person's finger tips.

The shape described above allows the handle to sit in and be captured by the hand of an adult user, in such a manner as to be firstly comfortable and secondly in such a way that when fluorescent lamp 56 is switched on, a user can be grabbing a substantial proportion of the handle's surface area yet not need to shield light output from the lamp 56.

This advantage results from a combination of both the slender configuration of the handle 14 and the size and the location of the lamp 56 in the end 16. It will be noted from figure 3 that the contour of the lens assembly 18, and in particular the lens 52, follows the general elliptical shape of the handle 14.

Illustrated in figures 3A, 3B and 3D are irregular hexagonal and irregular octagonal cross sections that could also be utilised to provide the same advantages of the invention. Illustrated in figure 3C is a lenticular shape also able to be used to the same effect. In 3E is a generally triangular shaped cross section where the second lens assembly 18 would need to be located at an upper apex as indicated by assembly 18. In figure 3F is a lozenge shaped cross section. In each of figures 3A, 3B, 3C, 3D, 3E and 3F item 18 indicates the location of the second lens assembly which contains a fluorescent lamp.

The shapes of figures 3, 3A, 3B, 3C, 3D and 3F all show examples of handle cross sections which taper at an top and a bottom edge of the handle. Further figure 3E tapers along the whole height of the handle. If desired, the taper on the handle need only be in the vicinity of the fluorescent lamp and lens assembly 18 and thus combinations of the top halves of the shapes illustrated in figures 3, 3A to 3F can be combined with other shapes for the lower half of the handle. Thus, if desired a handle cross section can be part lenticular, part elliptical, part tapering etc with the proviso that the tapering shape be along the edge where the second lens assembly 18 is located.

The shape of the cross section of handle 14 is such that in use as an area light, an adult user's fingers will rest on one tapering side of the handle 14, adjacent lens assembly 18, (with a user's fingers preferably not contacting the lens assembly 18), and the user's thumb on the other tapering side of handle 14.

Due to the tapering or diverging shape from narrow end 16 to narrow end 16B (or vice versa), it means that a better grip is attained when used in area light mode as a user's fingers and thumb have to be prised apart before the flashlight 10 can drop out of a user's hands in the direction of narrow end 16 to narrow end 16B.

Thus other shapes which have either an always diverging then always converging shape such as in figures 3 or 3C, or initially diverging, partially constant, finally converging as in figures 3A or 3B can be used.

It will be noted that cross sections of figures 3, 3A, 3B, 3C, 3D and 3F are symmetrical about two axes, while cross section 3E is symmetrical about one axis only.

It is important to note that in the above description the terms upper and lower are used relative to the orientation of the flashlight 10 as illustrated in the accompanying figures. Clearly, in use, the flashlight 10 could adopt many different orientations in which case ends 16 and 16B may not be in an upper/lower positional relationship.

It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings. All of these different combinations constitute various alternative aspects of the invention.

The foregoing describes embodiments of the present invention and modifications, obvious to those skilled in the art can be made thereto, without departing from the scope of the present invention.

Claims

1. A lighting device including:

a handle portion having a cross section which comprises narrow ends which diverge as they extend toward a central portion of said cross section;

a first lens assembly at an end of said handle portion;

a second lens assembly located in said handle portion at one of said narrow ends of said cross section, said second lens assembly contoured to match said handle portion.

2. A lighting device including:

a generally elongate handle having a width which is narrower than its depth, the handle tapering along at least one side thereof in transverse cross-section;

a first lens assembly mounted to one end of the handle adapted to direct a light beam in a direction which is substantially coaxial with the length of the handle; and

a second lens assembly located in the handle and aligned generally parallel to the length of the handle, the second lens assembly adapted to direct light emitting from the lens assembly in a direction generally perpendicular to the length of the handle.

3. A lighting device as claimed in claim 1 or 2, wherein said second lens assembly has a fluorescent lamp associated therewith.

4. A lighting device as claimed in claim 3, wherein fluorescent lamp is of a diameter in the range of 2mm to 8mm.

5. A lighting device as claimed in claim 4 wherein said fluorescent lamp is approximately 3mm in diameter.

6. A lighting device as claimed in any one of claims 1 to 6, wherein said handle portion is curved or angled so that when a rear portion of said handle is substantially horizontal said first lens assembly will direct light at an angle to the horizontal.

7. A lighting device as claimed in any one of claims 1 to 6, wherein said narrow ends of said cross section diverge towards the centre of said cross section.

8. A lighting device as claimed in any one of claims 1 to 6, wherein the handle's cross section has a constant width for a predetermined length between said ends which diverge towards the centre of said cross section.

9. A lighting device as claimed in any one of claims 1 to 8, wherein said cross section of said handle portion is elliptical.

10. A lighting device as claimed in any one of claims 1 to 8, wherein said cross section of said handle portion is an irregular hexagon or irregular octagon.

11. A lighting device as claimed in any one of claims 1 to 8, wherein said cross section of said handle has a major axis of symmetry and a minor axis of symmetry.

12. A lighting device as claimed in any one of claims 1 to 8 wherein said cross section of said handle is a generally triangular shape.

13.A lens assembly for a flashlight, said lens assembly including first and second generally elongate translucent panels, inclined relative to each other and joined together along a common longitudinal edge; a reflector located between the two panels adapted to reflect light towards said common edge, and an elongate fluorescent lamp mounted within the triangular space defined between the reflector and the two translucent panels and extending parallel to said common edge.

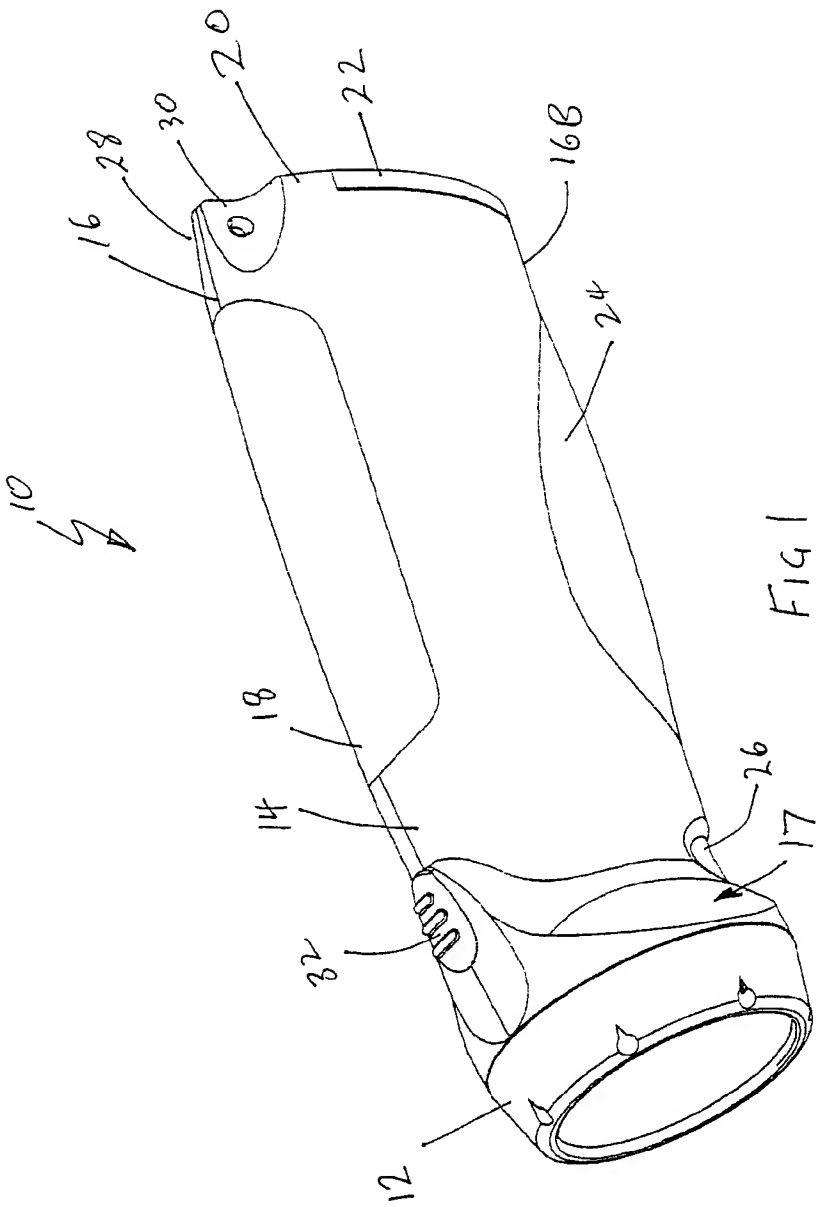


Fig 1

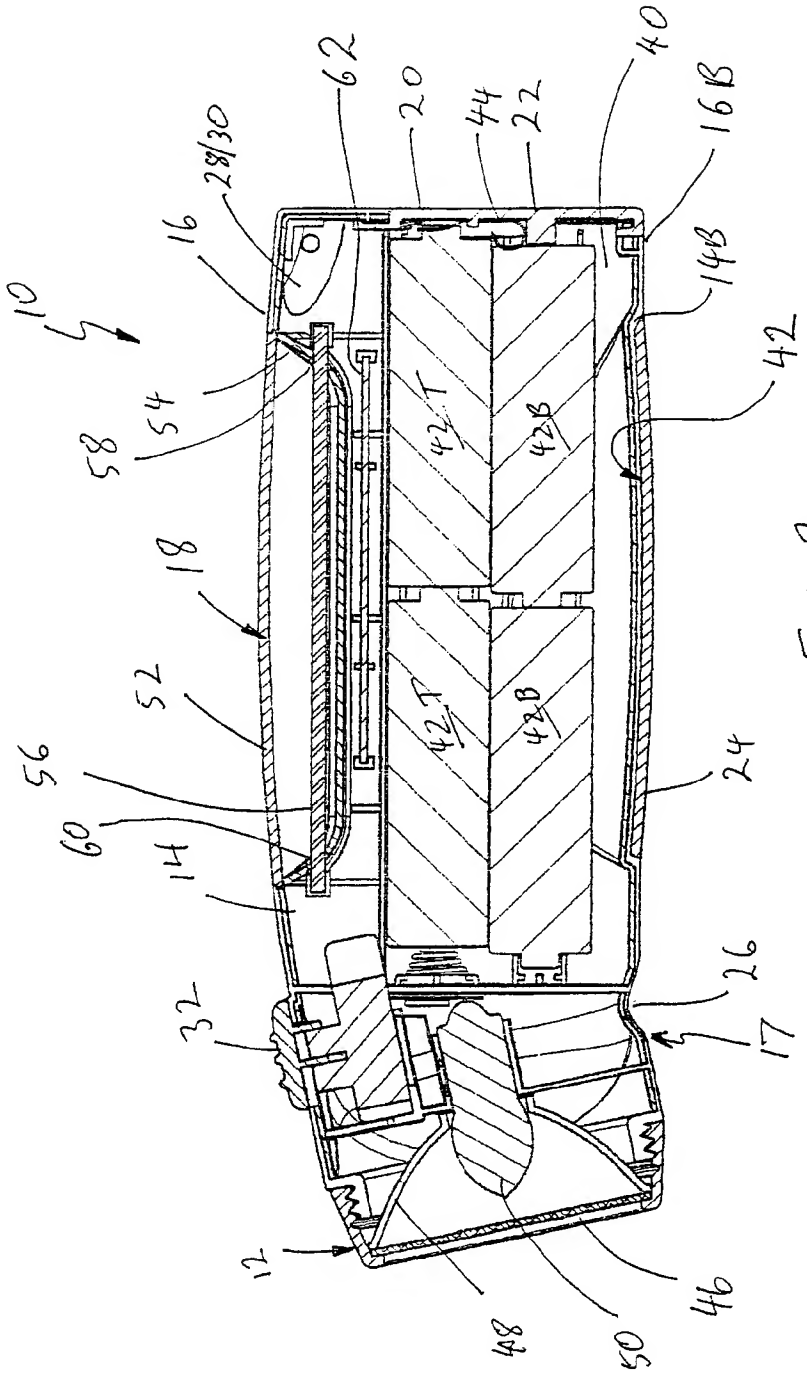

62
20
44
22
40
16B
28/30
16
14B
10
42
54
58
42T
42B
18
52
56
60
14
24
32
26
17
12
48
50
46

FIG 2

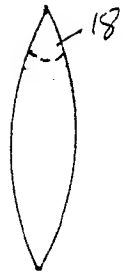


FIG 3C

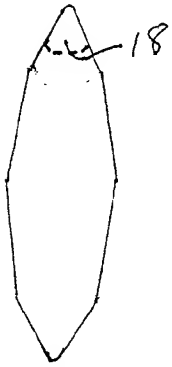


FIG 3D

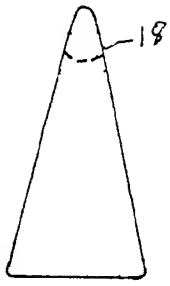
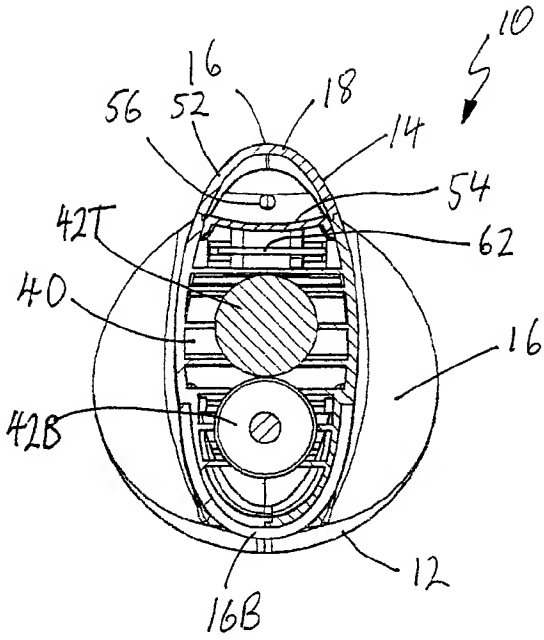


FIG 3E



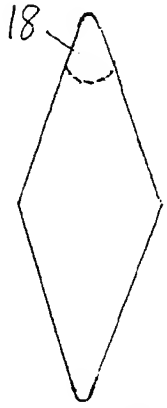


FIG 3F

FIG 3

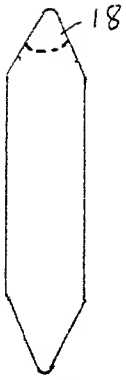


FIG 3A

FIG 3B

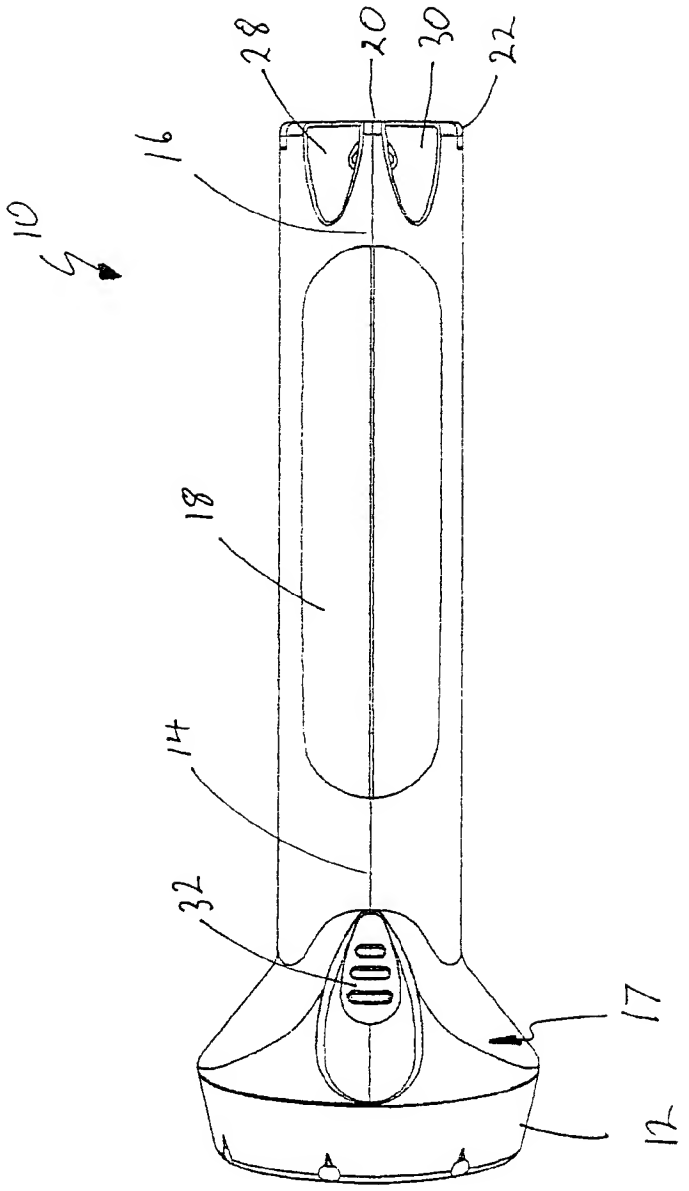


FIG 4

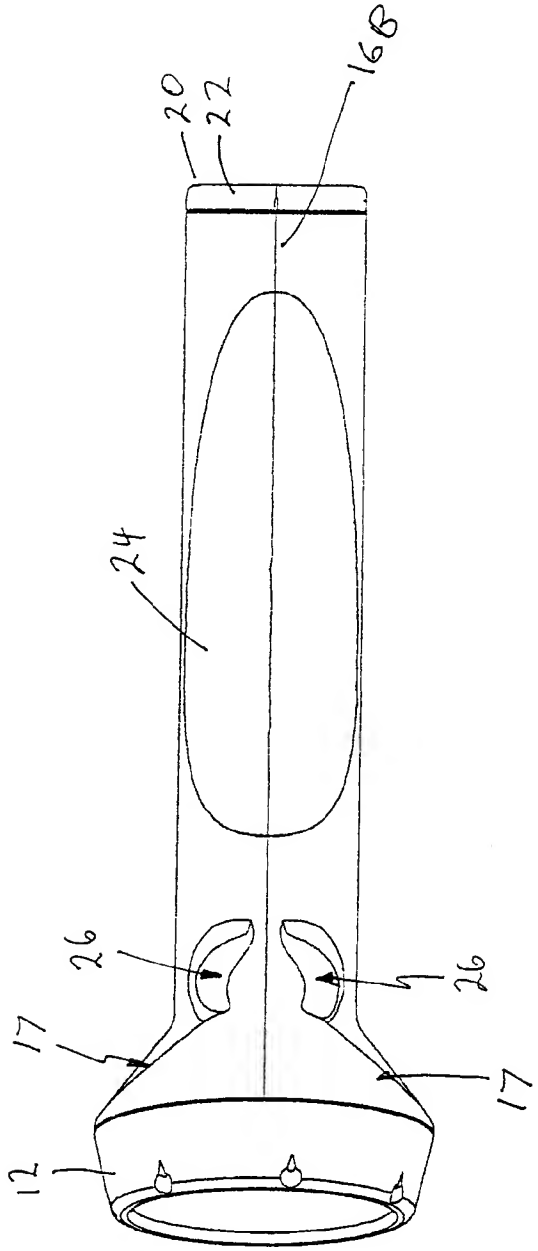


FIG 5

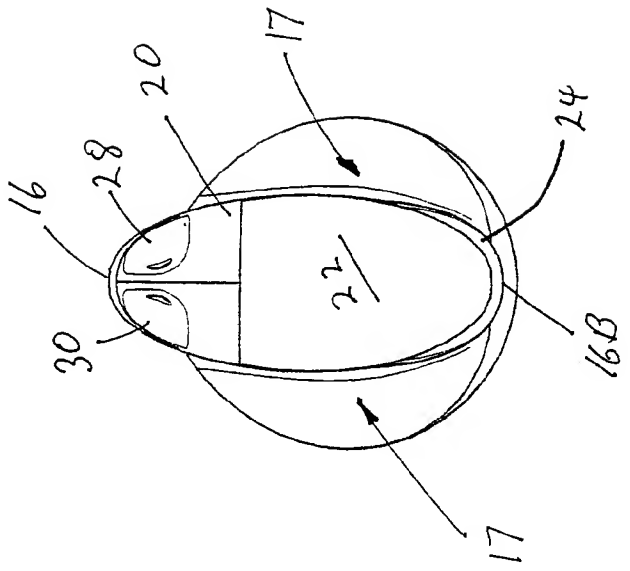


FIG 6

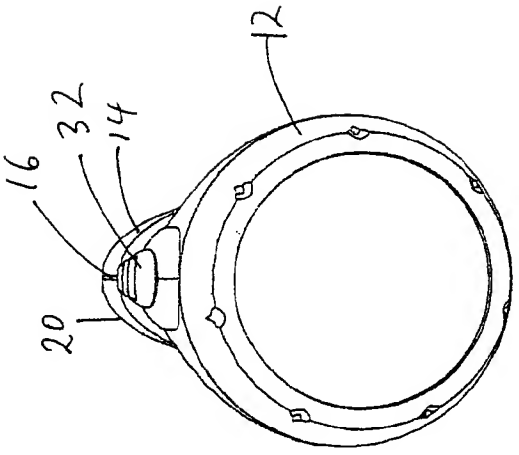


Fig 7

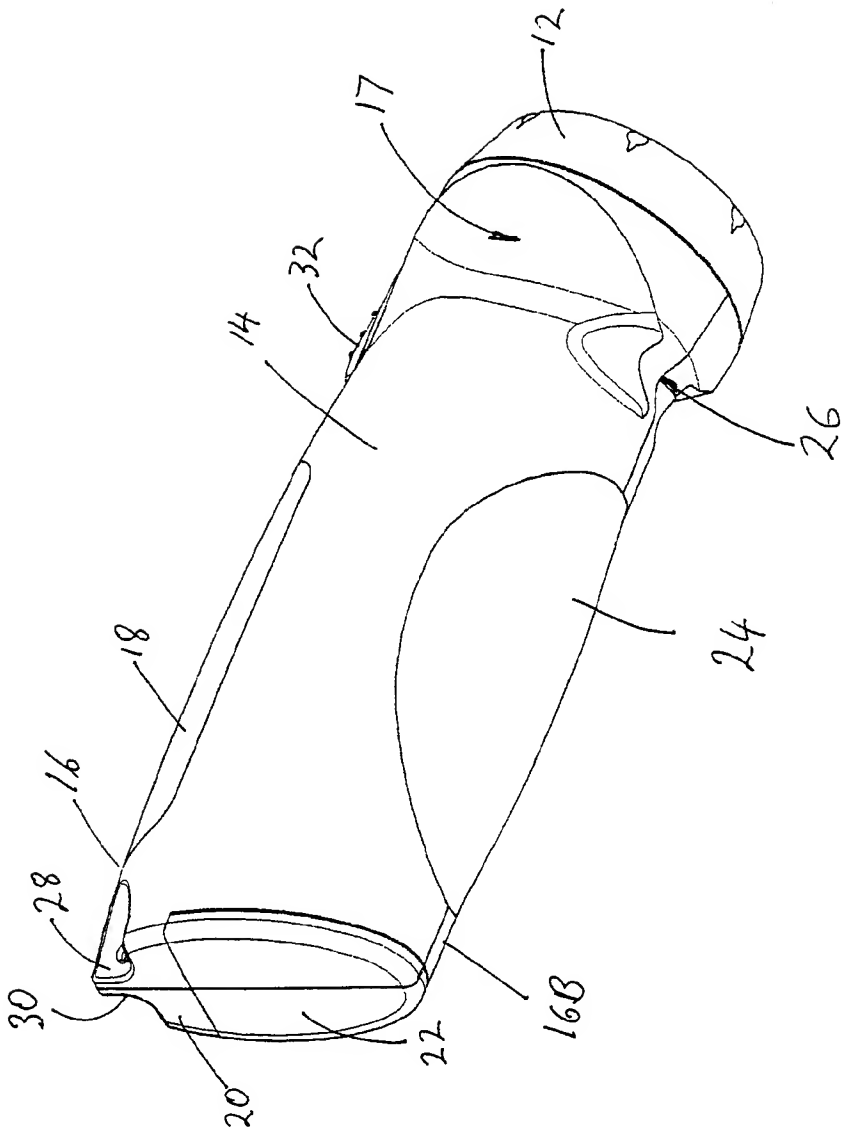


Fig 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/01230

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl.[7] F21L 4/02, F21V 21/40 // F21W 131:30, F21Y 101:00, 103:00, 113:02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl.[7] F21L 4/02, 1/-, 3/-, 5/-, 7/-, 9/-, 11/-, 15/12, F21V 21/40

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DWPI, JAPIO, IFIPAT - *Int.Cl.*[7] as above with keywords hand+, grip+, holder, first, second, two, fluorescen+, incandescen+, taper+, converg+, diverg+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2309512 A (ALLIANCE INDUSTRIAL CO LTD) 30 July 1997 Figures 1, 2, 5; page 1, lines 2 - 18; page 5, line 21 - page 9, line 23	1-3
X	US 4432043 A (YUEN) 14 February 1984 Figures 1 - 6; column 1, lines 5 - 65; column 2, line 45 - column 4, line 48	1-3
X	US 5467258 A (BAMBER et al.) 14 November 1995 Figure 6; column 2, lines 3 - 55	1-3

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 October 2000	- 2 NOV 2000
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **RAJEEV DESHMUKH** Telephone No : (02) 6283 2145

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/01230

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	GB 2172097 A (EVER READY LIMITED) 10 September 1986	
X	Figure 1; page 1, lines 5 - 31	1-3
	US 4977489 A (FUNG) 11 December 1990	
A	Figures 1 - 3	1-3

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/01230

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
GB	2309512	NONE					
US	4432043	GB	2112513	HK	183/86	JP	58111252
		PH	18830				
US	5467258	CA	2096885				
GB	2172097	NONE					
US	4977489	NONE					

END OF ANNEX